**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| Application of: | Li et al. |
| Serial Number: | 09/943,919 |
| Filed: | August 31, 2001 |
| For: | **Printed Textile Substrate** |
| Group Art Unit: | 1774 |
| Examiner: | Shewareged, Betelhem |

Commissioner for Patents
PO Box 1450
Alexandria VA 22313-1450

Sir:

**AFFIDAVIT BY SHULONG LI**

**Certificate of Mailing Under 37 CFR § 1.8**

I hereby certify that this correspondence, and all correspondence referenced herein as being enclosed with this correspondence, is being deposited with the United States Postal Service in an envelope addressed to "Commissioner for Patents, PO Box 1450, Alexandria VA 22313-1450" with sufficient postage on the following

Date: JULY 20, 2006

Signature: Alissa D. Kohlman

Name: ALISSA D. KOHLMAN

## AFFIDAVIT BY SHULONG LI

1. My name is Shulong Li and I reside at 204 Woodgrove Trace, Spartanburg, SC 29301.

2. I have a PhD in Materials Science and Engineering from University of Minnesota, which I received in 1993.

3. I am a Research Associate for Milliken & Company and have been employed by Milliken and Company since 1994. In particular, I have specialized in Textile Chemistry.

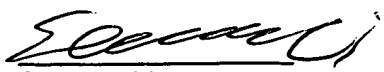
4. I am one of the inventors on the above-referenced patent application.

5. I have reviewed the monomer and polymer compounds in EP 0896 883 (Kawai et al). The cationic polymer is formed from an addition polymerization of cationic monomer and a crosslinking agent. The crosslinking agent includes a silyl condensing group.

6. Kymene 736, referred to in the specification on page 5, lines 25 and 31 and page 9, line 24 and used in the examples is available from Hercules Incorporated and comprises a polyamine-co-epichlorohydrin condensation polymer, namely, poly(hexamethylenediamine-co-epichlorohydrin). Further evidence to this effect is the attached MSDS for Kymeme 736 and an e-mail addressed to myself from William LaRue, Sr. Sales and Marketing Representative for the Industrial Specialties Division of Hercules Incorporated.

7. Kymene 736, or poly(hexamethylenediamine-co-epichlorohydrin), does not contain a silyl group.

7. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



Shulong Li

July 18, 2006

**WLaRue@Herc.com**
12/11/2002 02:11 PM

To: shulong.li@milliken.com
cc:
Subject: Chemistry of Kymene 736/Reten 204LS

SHulong:

To confirm our phone conversation, both of the Kymene 736 and Reten 204LS resins are [poly(hexamethylenediamine-co-epichlorohydrin)] resins. These products do not contain any polyamide functionality. The reference to Kymene 736 being a "polyamide-epichlorohydrin" crosslinking resin as stated in our Product data sheet is in error.

We apologize for any confusion this may have caused. Feel free to contact me or Dr. Richard Riehle at 302-995-4405if you or your staff has any further questions regarding this matter.

Regards, Bill

William LaRue
Sr. Sales and Marketing Representative
Industrial Specialties Division
Hercules Incorporated
(302) 992-7112
fax (302) 992-7145

HERCULES

MSDS 113

| | | |
|---|---|---|
| MSDS NO.: | 595 6152 0200 | REV.: 04 |
| ISSUE DATE: | 09/23/94 | |
| SUPERSEDES: | 595 6152 0200 | REV.: 03 |
| | 11/12/93 | |

Hercules Incorporated
Hercules Plaza
Wilmington, DE 19894-0001
(302) 594-5000 (24 hrs)

## SECTION 1: PRODUCT IDENTIFICATION

**PRODUCT NAME:** KYMENE® 736 wet strength resin

**APPEARANCE:** liquid

**COLOR:** amber

**ODOR:** odorless

**CASRN:** proprietary

**HMIS RATINGS**

**Health hazard:** 2 MODERATE

**Flammability hazard:** 0 MINIMAL

**Reactivity hazard:** 0 MINIMAL

**CHEMICAL DESCRIPTION:** aqueous solution of a cationic amine polymer-epichlorohydrin adduct

## SECTION 2: HAZARDOUS COMPONENT INFORMATION

| Hazardous Ingredients | CASRN | Wt. % |
|---|---|---|
| 1,3-dichloropropan-2-ol | 000096-23-1 | < 1.0 |

## SECTION 3: HAZARDS IDENTIFICATION

**EMERGENCY OVERVIEW:** *WARNING!*

May cause eye irritation.
May cause skin irritation.
Inhalation of vapor may cause respiratory tract irritation.
Inhalation of mist may cause respiratory tract irritation.

**POTENTIAL HEALTH EFFECTS:**

Possible cancer hazard. Product contains 1,3-dichloropropan-2-ol, a component that may cause cancer based on animal and other laboratory studies. Risk of cancer depends on duration and level of exposure. Overexposure to 1,3-dichloropropan-2-ol may cause kidney or liver damage.

Refer to Section 5 for Hazardous Combustion Products, and Section 10 for Hazardous Decomposition/Hazardous Polymerization Products.

## SECTION 4: FIRST AID PROCEDURES

**EYES:** Remove contact lenses. Hold eyelids apart. Immediately flush eyes with plenty of low-pressure water for at least 15 minutes. Get immediate medical attention.

**SKIN:** Wash thoroughly with soap and water. Remove contaminated clothing. Thoroughly wash clothing before reuse.

**INHALATION:** Remove to fresh air. Treat any irritation symptomatically. Get medical attention if cough or other symptoms develop.

**INGESTION:** If conscious, drink large quantities of water. Induce vomiting. Get immediate medical attention. NEVER give anything by mouth to an unconscious person. NEVER induce vomiting in an unconscious person.

## SECTION 5: FIRE HAZARDS

**FIRE FIGHTING PROCEDURES:**

This material is an aqueous dispersion and will not support combustion.

**EXTINGUISHING MEDIA:**

Water spray, dry chemical, foam, carbon dioxide or halon may be used on fires involving this product.

**CONDITIONS TO AVOID:**

None known.

**HAZARDOUS COMBUSTION PRODUCTS:**

If heated to decomposition, the following substances may be formed: carbon monoxide, carbon dioxide, nitrogen oxides, hydrogen chloride, ammonia, and hydrogen cyanide.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

Add absorbent, sweep up and discard. For large spills, dike to contain and pump into drums for use or disposal. Clean surrounding area with soda ash.

In case of accidental spill or release, refer to Section 8, Personal Protective Equipment and General Hygiene Practices.

## SECTION 7: HANDLING AND STORAGE

**GENERAL MEASURES:**

There are no unusual hazards associated with handling of this product.

Keep container closed when not in use.

**MATERIALS OR CONDITIONS TO AVOID:**

None known

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

**GENERAL HYGIENIC PRACTICES:**

Avoid breathing vapor or mists.
Avoid contact with eyes, skin, and clothing.
Wash thoroughly after handling, and before eating, drinking or smoking.
Remove contaminated clothing promptly and clean thoroughly before reuse.

**RECOMMENDED EXPOSURE LIMITS:**

| Hazardous Component | Wt. % | Limit | Basis |
|---|---|---|---|
| 1,3-dichloropropan-2-ol | < 1.0 | 2 ppm | Hercules recommended 8 hr. TWA |

**PERSONAL PROTECTIVE EQUIPMENT:**

Impervious gloves
Safety glasses
Appropriate respiratory protection is required when exposure to airborne contaminants may exceed acceptable limits. Respirators should be selected and used in accordance with OSHA, Subpart I (29 CFR 1910.134) and manufacturer's recommendations.

**WORK PRACTICES AND ENGINEERING CONTROLS:**

Eyewash fountains and safety showers should be easily accessible.
Enter confined space only after assuring that concentrations of hazardous ingredients are within the allowable limits or while using NIOSH-approved, supplied-air breathing apparatus.
Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Discharge from the ventilation system should comply with applicable air pollution control regulations.

**PROTECTIVE MEASURES DURING REPAIR AND MAINTENANCE:**

Completely isolate and thoroughly clean all equipment, piping, or vessels before beginning maintenance or repairs.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| **pH:** | 2.5-3.0 |
| **Solids, %:** | 38.0 |
| **Solubility in Water:** | miscible with water |
| **Vapor Pressure:** | similar to water |
| **Vapor Density:** | negligible at 20°C |
| **Evaporation Rate:** | similar to water |
| **Freezing Point:** | 32 ° F 0 ° C |

## SECTION 10: STABILITY AND REACTIVITY

**GENERAL STABILITY CONSIDERATIONS:**

Stable under recommended handling and storage conditions.

**INCOMPATIBLE MATERIALS:**

None known

**HAZARDOUS DECOMPOSITION PRODUCTS:**

None anticipated under normal or recommended handling and storage conditions.

**HAZARDOUS POLYMERIZATION:**

Not anticipated under normal or recommended handling and storage conditions.

## SECTION 11: TOXICOLOGICAL INFORMATION

**REPORTED HUMAN EFFECTS:**

PRODUCT/SIMILAR PRODUCT - No human toxicity studies have been carried out with this product.

**REPORTED ANIMAL EFFECTS:**

PRODUCT/SIMILAR PRODUCT - No animal toxicity studies have been carried out with this product.

COMPONENT - 1,3-dichloropropan-2-ol: Acute studies: Oral LD50 (rat) 110 mg/kg. Oral LD50 (mouse) 100 mg/kg. Inhalation LC50 (4 hrs, rat) 125 ppm, (2/6 deaths); 250 ppm (6/6 deaths). Dermal LD50 (rabbits) 800 mg/kg. Skin irritation (rabbit) mild; eye irritation (rabbit) severe. Liver and kidney damage was observed in acute oral and inhalation studies. Subacute studies: 13-week oral gavage (rat). Dose level of 100 mg/kg/day produced decreases in body weight gain, feed consumption, and hematologic parameters, increases in clinical chemistry values, and kidney and liver weight ratios. Doses of 1 mg/day considered as no-observed-adverse-effect level (NOAEL).

COMPONENT - polyamine resin: Not toxic by OSHA/ANSI criteria based on acute animal peroral testing of this or a similar product (LD50 >500 mg/kg). Skin sensitization (guinea pig): Not a sensitizer.

**CARCINOGENICITY INFORMATION:**

PRODUCT/SIMILAR PRODUCT - Not listed as a carcinogen by NTP. Not regulated as a carcinogen by OSHA. Not evaluated by IARC..

COMPONENT - 1,3-dichloropropan-2-ol: Chronic drinking water study in rats caused liver, kidney, oral and thyroid tumors at 80 mg/liter. No effect noted at 27 mg/liter.

**MUTAGENICITY/GENOTOXICITY INFORMATION:**

PRODUCT/SIMILAR PRODUCT - No mutagenicity studies have been carried out with this product.

COMPONENT - 1,3-dichloropropan-2-ol: Active in the Ames test. Caused sister chromatid exchange and chromosome aberrations in Chinese hamster ovary cells and mutation of mouse lymphoma cells.

## SECTION 12: ECOLOGICAL INFORMATION

**ECOTOXICITY:**

PRODUCT/SIMILAR PRODUCT - Cationic polymers, in general, exhibit high toxicity to aquatic organisms when tested in purified laboratory water. However, when tested in water supplemented with organic acids at a level simulating natural water conditions, the results demonstrated a 100-fold decrease in toxicity.

**Aquatic:**

COMPONENT - 1,3-dichloropropan-2-ol: Acute aquatic 24-hour LC50, in the Goldfish, falls within the practically nontoxic range of 100-1000 mg/L.

COMPONENT - polyamine resin: Acute aquatic 96-hour static LC50 value falls within the highly toxic range of 0.1-1.0 mg/L. Fathead minnows was the species tested.

COMPONENT - polyamine resin: Acute aquatic 48-hour static EC50 value, in the Daphnia, falls within the highly toxic range of 0.1-1.0 mg/L.

**Biodegradability:**

Based upon data from this or similar materials, this product cannot be regarded as readily biodegradable; however, it may be slowly biodegradable.

## SECTION 13: DISPOSAL CONSIDERATIONS

**WASTE DISPOSAL METHOD:**

Incineration in accordance with applicable regulations is the recommended disposal method. Supplemental fuel may be required. When the drum is empty, rinse it with plenty of water before discarding.

## SECTION 14: TRANSPORTATION INFORMATION

For information regarding transportation of this product, please contact Hercules Transportation at (302) 594-7356.

## SECTION 15: REGULATORY INFORMATION

**CHEMICAL INVENTORIES:**

**U. S. TSCA Status:** Included on TSCA inventory.

**SARA TITLE III**

**Sections 302 and 304:**

This product is not an Extremely Hazardous Substance subject to reporting under 40CFR355.

**Sections 311 and 312:**

HC-1: Acute health hazard
HC-2: Chronic health hazard
NPH: Not a physical hazard

**Section 313:**

This product does not contain any chemicals subject to reporting under Section 313 of Title III of the Superfund Amendments and Reauthorization Act and 40CFR372.

**CERCLA**

This product does not contain any chemicals subject to reporting as a CERCLA Hazardous Substance under 40CFR302.4.

**RCRA**

This product is not a hazardous waste as listed in 40CFR261.33. It does not exhibit any of the hazardous characteristics listed in 40CFR261, Subpart C.

## SECTION 16: OTHER INFORMATION

**LIST OF ACRONYMS:**
ACGIH: American Conference of Governmental Industrial Hygienists
AICS: Australian Inventory of Chemical Substances
AIHA WEEL: American Industrial Hygienists Association - Workplace Environmental Exposure Level
ANSI: American National Standards Institute
C: Ceiling
CASRN: Chemical Abstracts Service Registry Number
CERCLA: Comprehensive Emergency Response, Compensation and Liability Act
DSL: Domestic Substances List (Canadian)
EINECS: European Inventory of Existing Commercial Chemical Substances
HMIS: Hazardous Materials Identification System
IARC: International Agency for Research on Cancer
MITI: Ministry of International Trade and Industry (Japanese)
N/A: Not Applicable
NDSL: Non-domestic Substances List (Canadian)
NOR: Not Otherwise Regulated
NTP: National Toxicology Program
OSHA: Occupational Safety and Health Administration
PEL: OSHA Permissible Exposure Limit
RCRA: Resource Conservation and Recovery Act
RQ: Reportable Quantity
SARA: Superfund Amendment Reauthorization Act
STEL: Short-Term Exposure Limit
TLV: Threshold Limit Values (registered trademark of ACGIH)
TPQ: Threshold Planning Quantity